

## A New Land-hopper Genus, *Nipponorchestia*, with Two New Species from Japan (Crustacea, Amphipoda, Talitridae)

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**Abstract** *Nipponorchestia* gen. nov. with two new species is described from terrestrial habitats in Japan. It is characterized by elongate antenna 1, 4-dentate lacinia on left mandible, maxilliped palp article 2 with mediiodistal lobe, strongly subchelate gnathopod 1 in both sexes, cuspidactylate pereopods, moderately reduced pleopods, and marginally bare outer ramus of uropod 1. These features distinguish the new genus from allied genera: *Bousfieldia* Chou and Lee, 1996, *Lanorchestia* Miyamoto and Morino, 2010 and *Paciforchestia* Bousfield, 1982. *Nipponorchestia curvatus* sp. nov. occurs in coastal habitats and *N. nudiramus* sp. nov. in inland habitats; both species are separable by the shape of antenna 1.

**Key words:** Amphipoda, land-hoppers, *Nipponorchestia*, new genus, new species, Talitridae, Japan.

### Introduction

Morino (1999) recognized 19 talitrid species within 7 genera from Japan: five species in *Platorchestia* Bousfield, 1982 (*platensis* (Krøyer, 1845), *pachypus* (Derzhavin, 1937), *humicola* (Martens, 1868), *japonica* (Tattersall, 1922), sp.); two species in “*Talorchestia*” (now *Sinorchestia* Miyamoto and Morino, 1999) (*sinensis* Chilton, 1925, *nipponensis* Morino, 1972); one species in *Trinorchestia* Bousfield, 1982 (*trinitatis* (Derzhavin, 1937)); three species in “*Orchestia*” (*kokuboi* Uéno, 1929, *solifuga* Iwasa, 1939, *ditmari* (Derzhavin, 1937)); three species in *Paciforchestia* Bousfield, 1982 (*pyatakovi* (Derzhavin, 1937), sp. 1, sp. 2); one species in *Traskorchestia* Bousfield, 1982 (*ochotensis* Brandt, 1851); and four species in “*Parorchestia*” (sp. 1, sp. 2, sp. 3, sp. 4). Recently two genera and two species have been added to this list: *Minamitalitrus zoltani*, White, Lowry and

Morino, 2013 from Daito Islands (White, Lowry and Morino, 2013) and *Talitroides topitotum* (Burt, 1934) from a forest in Okinawa Island (Morino, 2013). Those undescribed species in Morino (1999) have now being named and published for each genus; thus “*Parorchestia*” sp. 4 and sp. 2 have been described under the name of *Mizuhorchestia urospina* Morino, 2014 (Morino, 2014a) and *Bousfieldia omoto* Morino, 2014 (Morino, 2014b), respectively. In the present paper, the remaining two species of “*Parorchestia*” are described under a new genus, *Nipponorchestia*.

### Methods

The methods follow basically Morino (2014a). Specimens were dissected under a stereomicroscope, then appendages and bodies were depicted under a light microscope using a drawing-tube. The illustrated parts were fixed on slide mounts

with Hoyer's medium or kept in small tubes. The body length measured from the tip of head to the tip of telson along straightened dorsal margin. In the species description, generic characters are basically not repeated; for a second species, studied characters are illustrated and different character states than a first one are described; for an alternative sex, sexual characters are described. The specimens studies are deposited in the collection of the National Museum of Nature and Science, Tsukuba (NSMT).

### Taxonomy

Family Talitridae

*Nipponorchestia* gen. nov.

[New Japanese name: Nippon-tobimushi zoku]

*Type species.* *Nipponorchestia curvatus* sp. nov.

*Additional species.* *N. nudiramus* sp. nov.

*Diagnosis.* Body size medium, eyes small to medium. Antenna 1, peduncle reaching end of peduncular article 4 of antenna 2; peduncle longer than flagellum, peduncular articles 1–3 subequal in length. Antenna 2 in male not incrassate, flagellum longer than peduncle. Mandible left lacinia 4-dentate. Maxilliped palp articles 2 and 3 broad, mediolaterally lobate, article 4 distinct, reduced, apically positioned on article 3.

Gnathopod 1 strongly subchelate in both sexes; in male, merus, carpus and propodus with broad based pellucid lobes, propodus lateral surface with a row of elongate setae; in female, carpus with small pellucid lobe, or lacking. Gnathopod 2 in male, propodus powerfully subchelate, dactylus attenuated apically; in female, basis slender, propodus mitten-shaped. Pereopods 3–7 cuspidactylate (bi-cuspsate), propodus locking robust setae well-developed. Coxa of pereopod 4 wider than deep. Coxa of pereopod 6, posterior lobe smoothly curved. Pereopods 6 and 7 in male not incrassate. Coxal gills of pereopods 2 and 6 large, lobate at middle. Oostegites simple-setose.

Pleonite side plates lacking marginal pits. Pleopods peduncle marginally bare or weakly

robust-setose; rami moderately reduced. Uropod 1, distolateral robust seta on peduncle longer than subdistal one; inner ramus with dorso-marginal robust setae; outer ramus marginally bare. Uropod 2, rami subequal in length, marginally robust-setose. Uropod 3, peduncle truncate or narrowing distally; ramus short. Telson lobe with a lateral and apical robust setae.

*Remarks.* *Nipponorchestia* gen. nov. is allied to *Bousfieldia* Chou and Lee, 1996, *Lanorchestia* Miyamoto and Morino, 2010 and *Paciforchestia* Bousfield, 1982. These four genera share the following character states: 1) antenna 1 reaching or exceeding end of peduncular article 4 of antenna 2, 2) maxilliped palp article 2 broad and mediolaterally lobed, article 4 reduced but distinct, 3) deeply subchelate gnathopod 1 in both sexes, 4) gnathopod 1 in male with pellucid lobes on merus, carpus and propodus, 5) cuspidactylate pereopods, and 6) simple-tipped setae on oostegites. However, *Lanorchestia* is distinguished from the new genus by more elongate antenna 1 (reaching end of peduncular article 5 of antenna 2) and more robust-setose telson. *Paciforchestia* and *Bousfieldia* are differentiated from the new genus by 5-dentate lacinia on left mandible and developed pleopods, respectively. The Caribbean land-hopper genus, *Cerrorchestia* Lindeman, 1990, exhibits similar features to the present new genus in the antenna 1, maxilliped, coxal gills, and uropod 1, among others. However, females of *Cerrorchestia* bear gnathopod 1 with simple propodus, while those of the new genus show deeply subchelate states. *Mizuhorchestia* Morino 2014, which occurs in coastal to inland forest habitats in Japan (Morino, 2014a) is separated from the new species by non-lobate palp article 2 in maxilliped, and marginally robust-setose outer ramus in uropod 1.

*Etymology.* The generic name is cited from the modern Japanese name of Japan.

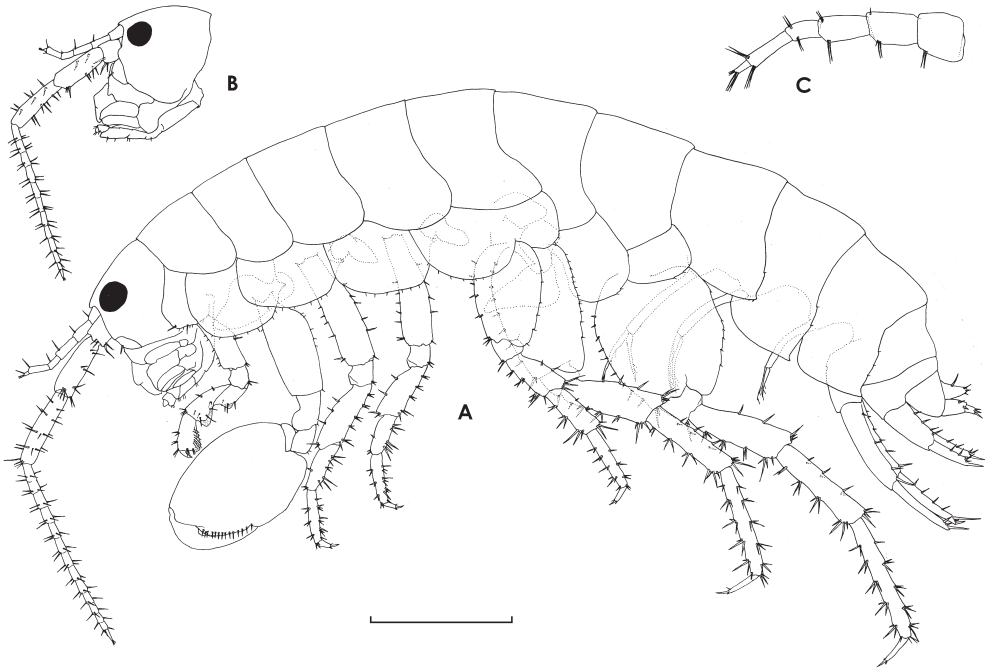


Fig. 1. *Nipponorchestia curvatus* gen. et sp. nov. A, C, male, 9.0 mm (holotype: NSMT-Cr 23795); B, female, 8.4 mm (allotype: NSMT-Cr 23794). Nabeta Bay, Shizuoka, Japan. — A, habitus, lateral view (after Morino, 1999); B, head; C, antenna 1. Scale: A–B, 1.43 mm; C, 0.71 mm.

***Nipponorchestia curvatus* sp. nov.**

[Japanese name: Hime-okatobimushi]

(Figs. 1–4)

“*Parorchestia*” sp. 1: Morino, 1999: 639 (Fig. 1), 644.

**Type material.** Holotype (NSMT-Cr 23795), male 9.0 mm; Nabeta Bay (back shore), Izu-shimoda, SHIZUOKA; 18–19 May 1983; Morino, H. collect. Allotype (NSMT-Cr 23794), female 8.4 mm (ovig.); same data as holotype. Paratypes: 1 male, 14 females, 3 juveniles (NSMT-Cr 23796); same data as holotype; 1 female 9.7 mm (NSMT-Cr 23785) and 1 male 8.8 mm (NSMT-Cr 23786), Hatakejima Island (near-shore forests), Tanabe Bay, WAKAYAMA; 20 Mar. 1973; Morino, H. collect. 1 male 8.1 mm (NSMT-Cr 23824) and 1 female 8.5 mm (NSMT-Cr 23825); Chihiro, Chichijima Island, Ogasawara Archipelago, TOKYO; 22 May 1999; Matsumoto, T. collect.

**Additional materials examined.** Materials are compiled by localities (prefectural regions).

CHIBA: 1 female (NSMT-Cr 23816); Obitsu River (estuary), Kuroto, Kisarazu; 25 Oct. 1998; Nomura, S. collect. 2 males, 2 females (NSMT-Cr 23788); Awa-kominato; 11 Jun. 1975; Komeda, S. collect.

TOKYO: 1 juvenile (NSMT-Cr 23790); Oshima Park (*Camellia japonica*, *Prunus donarium*, *Litsea galuca*, *Daphniphyllum teijsmanii*, 10 m alt.), Oshima Island; 15 Dec. 1981; Ando, A. collect. 24 males, 23 females, 47 juveniles (NSMT-Cr 23791); Oshima Park (*Pinus densiflora*, *D. teijsmannii*, 10 m alt.), Oshima Island; 15 Dec. 1981; Ando, A. collect. 1 female, 17 juveniles (NSMT-Cr 23792); Habu (*Camellia japonica*, *Prunus donarium*, 35 m, alt.), Oshima Island; 14 Dec. 1982; Ando, A. collect. 16 juveniles (NSMT-Cr 23805); Kakihara (*Camellia japonica*, *Litsea glauca*, 30 m alt.), Oshima Island; 21 Nov. 1983; Nakamura, S. and Ando, A. collect. 1 female, 6 juveniles (NSMT-Cr 23808); data as above except the date: 21 Oct.

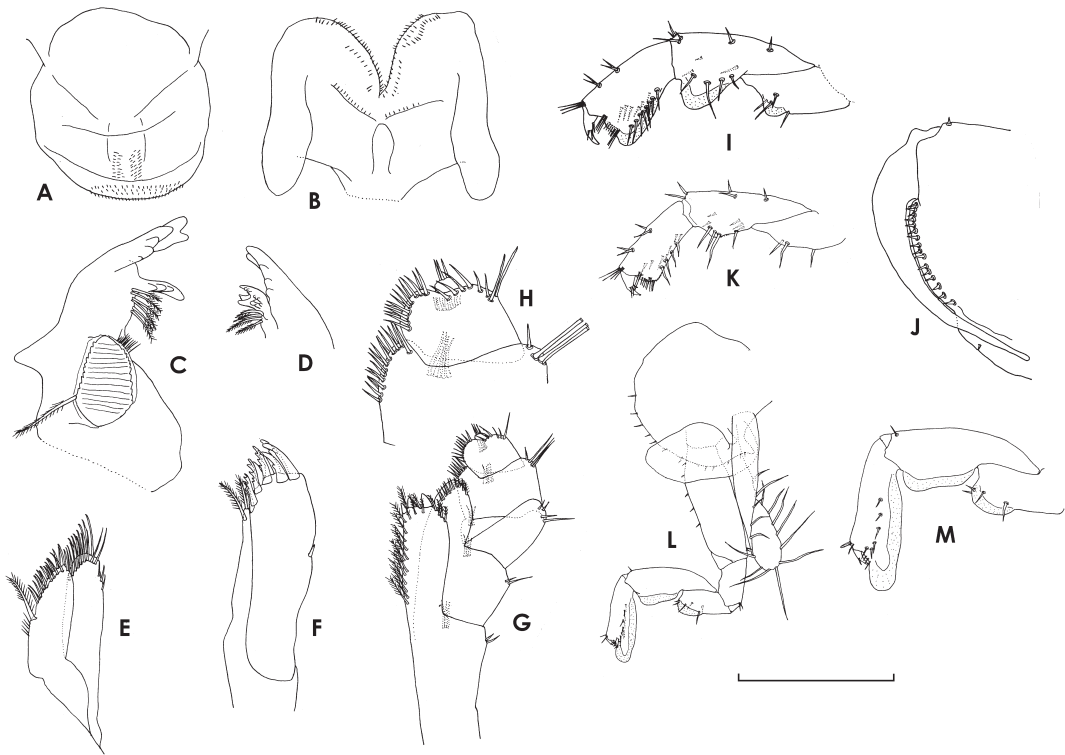


Fig. 2. *Nipponorchestia curvatus* gen. et sp. nov. A–J, male, 9.0 mm (holotype: NSMT-Cr 23795); K–M, female, 8.4 mm (allotype: NSMT-Cr 23794). Nabeta Bay, Shizuoka, Japan. — A, upper lip; B, lower lip; C, left mandible; D, distal part of right mandible; E, maxilla 2; F, maxilla 1; G, maxilliped; H, palp articles 2–4 of maxilliped; I, distal articles of gnathopod 1; J, palmar margin of gnathopod 2; K, distal articles of gnathopod 1; L, gnathopod 2; M, distal articles of gnathopod 2. Scale: A–G, 0.31 mm; H, 0.16 mm; I, K, M, 0.56 mm; J, 0.71 mm; L, 0.94 mm.

1983. 10 males, 16 females, 25 juveniles (NSMT-Cr 23797); Hachijo Island; 6–7 Nov. 1983; Hagino, Y. collect. 1 female (NSMT-Cr 23800); Mihara, Nakanogo (*Pleioblastus chino*, 160 m alt.), Hachijo Island; 7 Nov. 1983; Nakamura, O. collect. 2 males, 5 females, 48 juveniles (NSMT-Cr 23801); same data as above. 9 juveniles (NSMT-Cr 23802); Nakanogo (*Castanopsis cuspidata*, 240 m alt.), Hachijo Island; 7 Nov. 1983; Nakamura, O. collect. 1 male, 1 female, 15 juveniles (NSMT-Cr 23803), Tareto Bay (*Pleioblastus chino*, 40 m alt.); Hachijo Island; 7 Nov. 1983; Nakamura, O. collect. 1 male, 1 female, 11 juveniles (NSMT-Cr 23807); The airport (*Camella japonica*, *Litsea glauca*), Hachijo Island; 7 Nov. 1983; Nakamura, O. collect. 11 juveniles (NSMT-Cr 23804); Akabakyo (*Cas-*

*tanopsis cuspidate*, 50 m alt.), Miyake Island; 7 Dec. 1983; Nakamura, O. collect. 1 female, 19 juveniles (NSMT-Cr 23806); Kamitsuki (*Pleioblastus chino*, *Alnus sieboldiana*, 120 m alt.); Miyake Island; 6 Dec. 1983; Nakamura, O. collect. 1 female (NSMT-Cr 23827), 1 female and 3 males (NSMT-Cr 23829); near Mt. Hirone, Ototojima Island, Ogasawara Archipelago; Feb. 1997; Kishimoto collect. 1 female (NSMT-Cr 23828); near Mt. Tenkai, Ototojima Island, Ogasawara Archipelago; Feb. 1997; Kishimoto, T. collect. 1 male, 3 females, 1 juvenile (NSMT-Cr 23830); near Mt. Tenkai, Ototojima Island, Ogasawara Archipelago; date not known; Kishimoto, T. collect. 2 males, 2 females (NSMT-Cr 23832); near Ichinotani, Ototojima Island, Ogasawara Archipelago; Feb. 1997; Murata, K. collect. 2

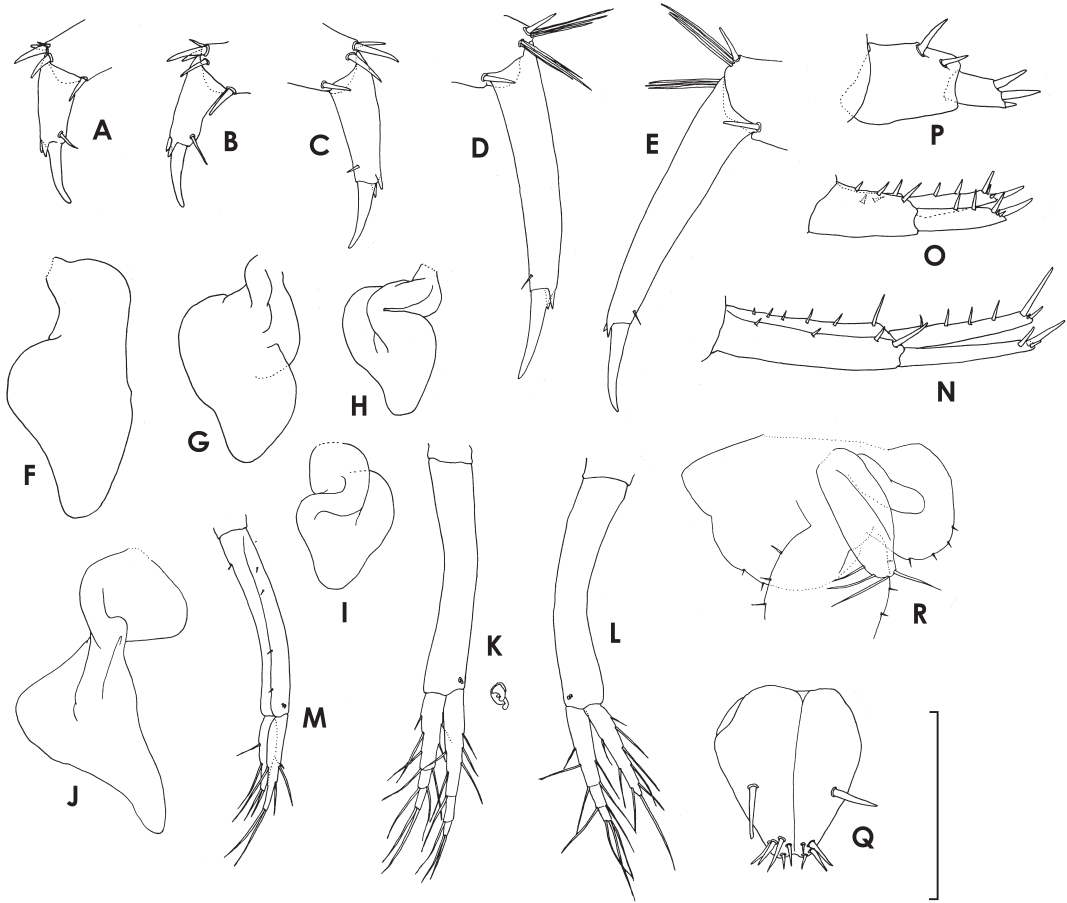


Fig. 3. *Nipponorchestia curvatus* gen. et sp. nov. A–Q, male, 9.0 mm (holotype: NSMT-Cr 23795); R, female, 8.4 mm (allotype: NSMT-Cr 23794). Nabeta Bay, Shizuoka, Japan. — A–E, dactyli of pereopods 3–7; F–J, coxal gills of pereopods 2–6; K–M, pleopods 1–3 and enlarged retinacula; N–P, uropods 1–3; Q, telson; R, coxal plate and oostegite of pereopod 5. Scale: A–E, 0.28 mm; F–J, 0.71 mm; K–M, 0.63 mm; N, O, R, 0.94 mm; P–Q, 0.48 mm.

females (NSMT-Cr 23833); Ainosawa, Ototojima Island, Ogasawara Archipelago; 9 Jul. 1997; Kishimoto, T. collect. 1 male 7.8 mm (NSMT-Cr 23819), 1 female (NSMT-Cr 23834), 4 females, 6 juveniles (NSMT-Cr 23835); west coast, Chichijima Island, Ogasawara Archipelago; 15 Jun. 1999; Matsumoto, T. collect. 7 juveniles (NSMT-Cr 23820); Minamizaki, Chichijima Island, Ogasawara Archipelago; 18 Jun. 1999; Matsumoto, T. collect. 1 male, 1 female, 1 juvenile (NSMT-Cr 23821); Chihiro, Chichijima Island, Ogasawara Archipelago; 28 Feb. 1999; Matsumoto, T. collect. 1 male, 4 females, 4 juveniles (NSMT-Cr

23822); Chihiro, Chichijima Island, 19 May 1999; Matsumoto, T. collect. 4 females (ovig.), 4 juveniles (NSMT-Cr 23823); Chihiro, Chichijima Island, Ogasawara Archipelago; 19 Jun. 1999; Matsumoto, T. collect. 2 males, 5 females, 4 juveniles (NSMT-Cr 23826); Chihiro, Chichijima Island, Ogasawara Archipelago; 22 May 1999; Matsumoto, T. collect. 1 female (NSMT-Cr 23831); Sekimon, Hahajima Island, Ogasawara Archipelago; 3 Jul. 1997; Kishimoto, T. collect. 1 female (ovig.) (NSMT-Cr 23912); Sekimon (*Fagata ailanthodes* Forest), Hahajima Island, Ogasawara Archipelago; 1 Nov. 1977; Sato, S.

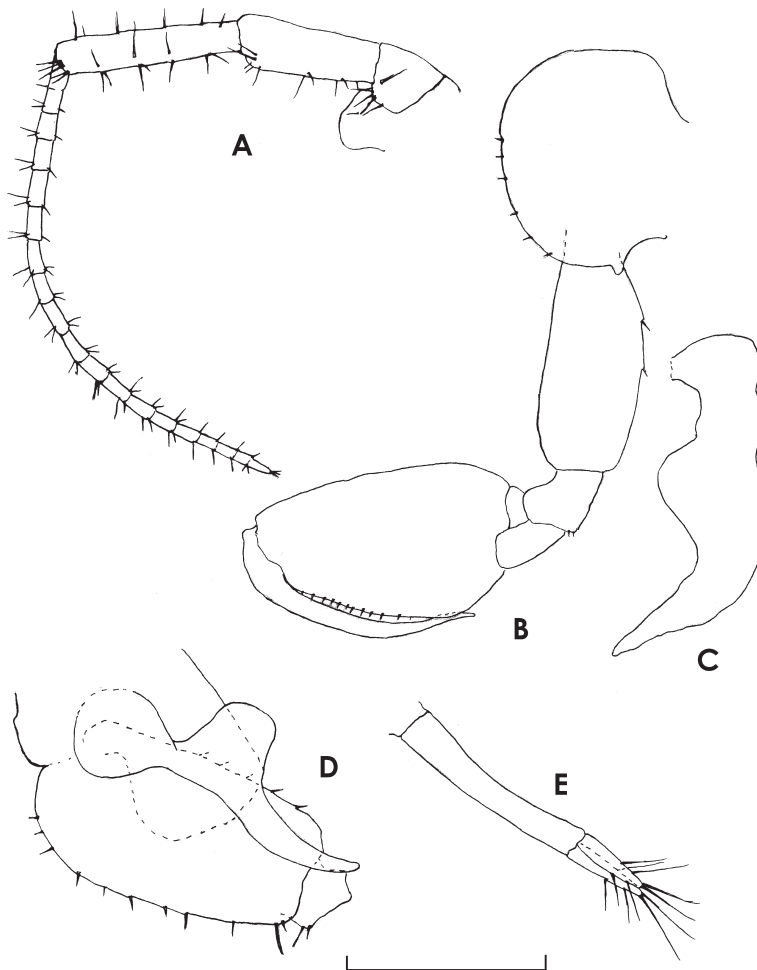


Fig. 4. *Nipponorchestia curvatus* gen. et sp. nov. Male, 8.1 mm (NSMT-Cr 23824). Chichijima Island, Ogasawara, Japan. — A, antenna 2; gnathopod 2; C, coxal gill of gnathopod 2; D, coxal gill of pereopod 6; E, pleopod 1. Scale: A–D, 0.88 mm; E, 0.60 mm.

collect.

SHIZUOKA: 4 males, 1 female (NSMT-Cr 23809); Izu-shimoda, 9 May 1985; Morino, H. collect.

WAKAYAMA: 6 males, 5 females (ovig.), 1 juvenile (NSMT-Cr 23784); Kashima Island (near-shore forests), Tanabe Bay; 13 Jun. 1972; Morino, H. collect. 4 males, 3 females, 2 juveniles (NSMT-Cr 23787); Hatakejima Island (near-shore forests), Tanabe Bay; 20 Mar. 1973; Morino, H. collect. 2 males, 2 juveniles (NSMT-Cr 23793); Esuzaki (under litter), Susami; 26 May 1982; Yoshida, M. collect.

SHIMANE: 3 juveniles (NSMT-Cr 23817); Ohashi River (beach); Yata, Asakumi-cho, Matsue; 24 Jun. 2003; Toda, K. collect.

YAMAGUCHI: 1 female (NSMT-Cr 23798); Yoshimi, Shimonoseki; 25 Sept. 1983; Nunomura, N. collect.

KOCHI: 3 males, 1 female, 1 juvenile (NSMT-Cr 23789); Ashizuri-misaki (“terrestrial”); 24 Aug. 1971; Inoue, H. collect. 1 juvenile (NSMT-Cr 23813); Okinoshima Island, Sukumo; 19 Aug. 1980; Shiba, M. collect. 1 juvenile (NSMT-Cr 23814); Usami; 29 Aug. 1970; Shiba, M. collect.

OITA: 12 juveniles (NSMT-Cr 23799);

Sakano-ura, Saeki; 23 Sept. 1983; Nunomura, N. collect.

KUMAMOTO: 1 female (NSMT-Cr 23818); Yokaku Bay (estuary), Amakusa-shimojima; 31 Jul. 2004; Wada, K. collect.

NAGASAKI: 1 male, 2 juveniles (NSMT-Cr 23810); Tomiga-ura (behind supralittoral zone), Tsushima Island; 11 Oct. 1986; Nunomura, N. collect. 1 male, 5 juveniles (NSMT-Cr 23811); Mogisaki, Tsushima Island; 11 Oct. 1986; Nunomura, N. collect. 2 males (NSMT-Cr 23812); Kechi, Mitsushima-cho, Tsushima Island; 12 Oct. 1986; Nunomura, N. collect.

KAGOSHIMA: 6 males, 3 females, 30 juveniles (NSMT-Cr 23815); Satomura Shrine (forest), Nakanoshima Island, Tokara, Nansei Archipelago; 9 Mar. 1994; Kurozumi, T. collect.

MIYAZAKI: 2 males, 8 females (ovig.), 2 juveniles (NSMT-Cr 23783); Horikirizaki (under stranded matter on supralittoral rocky floor); 18 May 1971; Morino, H. collect.

OKINAWA: 2 males, 1 female (NSMT-Cr 23913); near Yagazi Bridge (supralittoral, pebbles and litters), Yagazi; 22 May 1978; Morino, H. collect.

*Description of male (holotype).* Antenna 1 (Fig. 1A, C), flagellum with 3 articles, article 1 weakly curved, article 2 elongate, twice as long as article 1. Antenna 2 (Fig. 1A), peduncular article 5 subequal to articles 3 and 4 combined, flagellum with 14 articles. Upper lip (Fig. 2A) lacking robust setae. Mandible (Fig. 2C–D), insicor 5-dentate, left lacinia 4-dentate. Maxilliped (Fig. 2G–H), palp articles 2 and 3 broad, with mediobasal lobe, article 4 dome-shaped. Other mouth parts (Fig. 2B, E–F) same as other talitrid species.

Gnathopod 1 (Figs. 1A, 2I), carpus *ca.* 1.3 times as long as propodus, propodus with row of 8 setae on lateral surface, palmar margin vertical, exceeding dactylus. Gnathopod 2 (Figs. 1A, 2J), propodus enlarged, palmar margin smooth, shorter than posterior margin. Pereopod 4 (Fig. 1A) slightly shorter than pereopod 3 (Fig. 1A), dactylus (Fig. 3B) weakly pinched. Pereopods 5–7 (Fig. 1A) getting progressively longer poste-

riorly. Dactylus of pereopods 6 and 7 (Fig. 3D–E) slender, weakly curved. Coxal gills of pereopods 2 and 6 (Fig. 3F, J) large, lobed at middle; other gills (Fig. 3G–I) small, convoluted.

Pleonite side plates (Fig. 1A), posterodistal corner bluntly acuminate, with a few setules on posterior margin. Pleopods peduncle slender, with 2 retinacula; rami 0.5 to 0.6 times as long as peduncle, basal articles fused; pleopods 1 and 2 (Fig. 3K–L), peduncle marginally bare, rami with 3–4 articles; pleopod 3 (Fig. 3M) shortest, peduncle with several setules, rami with 2–3 articles.

Uropod 1 (Fig. 3N), inner ramus with 4 robust setae on dorsal margin. Uropod 2 (Fig. 3O), rami with 2 marginal robust setae each. Uropod 3 (Fig. 3P), peduncle and ramus with 2 dorsal and 3 robust apical setae, respectively. Telson lobe (Fig. 3Q) with a lateral and 4–5 apical robust setae.

*Female (allotype).* Gnathopod 1 (Fig. 2K) lacking pellucid lobe, carpus and propodus with scabrous surface on mid-posterior margin and posterodistal corner, respectively; propodus with 4 submarginal robust setae on lateral surface, palmar margin vertical, slightly exceeding dactylus. Gnathopod 2 (Fig. 2L), basis-propodus slender, merus with dome-shaped pellucid lobe, carpus and propodus with flat-shaped pellucid lobe. Oostegites of pereopod 2 (Fig. 2L) and pereopod 5 (Fig. 3R) with 14 and 4 simple-tipped setae, respectively.

*Etymology.* The species name refers to the curved antenna 1.

*Distribution.* The present species is collected from under litter or moist soils of coastal habitats including grasslands and forests, occasionally from near supralittoral zones. Geographically it occurs in central and south-west Honshu, Shikoku and Kyushu, as well as in southern islands including Tsushima, Nakanoshima (Nansei Archipelago), Okinawa and Izu to Ogasawara Archipelagos (Fig. 5).

*Remarks.* The allotype female, smaller body size (8.4 mm) than the holotype (9.0 mm), exhibits meristic characters with fewer numbers:



Fig. 5. Distribution of *Nipponorchestia curvatus* gen. et sp. nov. ★ from Miyamoto (1982).

11–12 flagellar articles in antenna 2, 3 dorsal robust setae on inner ramus of uropod 1, and 2 apical spines on telson lobe. Many specimens including the allotype bear smaller eyes than the holotype, as depicted in Fig. 1B.

Specimens from Chichijima Island (Ogasawara) display variation from the holo- and allotype in antenna 2, pleopods and coxal gills.

Thus a male (8.1 mm, NSMT-Cr 23824) and a female (8.5 mm, NSMT-Cr 23825) have 19 (Fig. 4A) and 17 flagellar articles in antenna 2, respectively, male gnathopod 2 with elongate propodus (palmar margin longer than posterior margin, Fig. 4 B), and more reduced pleopod rami with 2 or 3 articles (pleopod 1, Fig. 4E), 2 articles (pleopod 2), and 1 or 2 articles (pleopod 3). The coxal



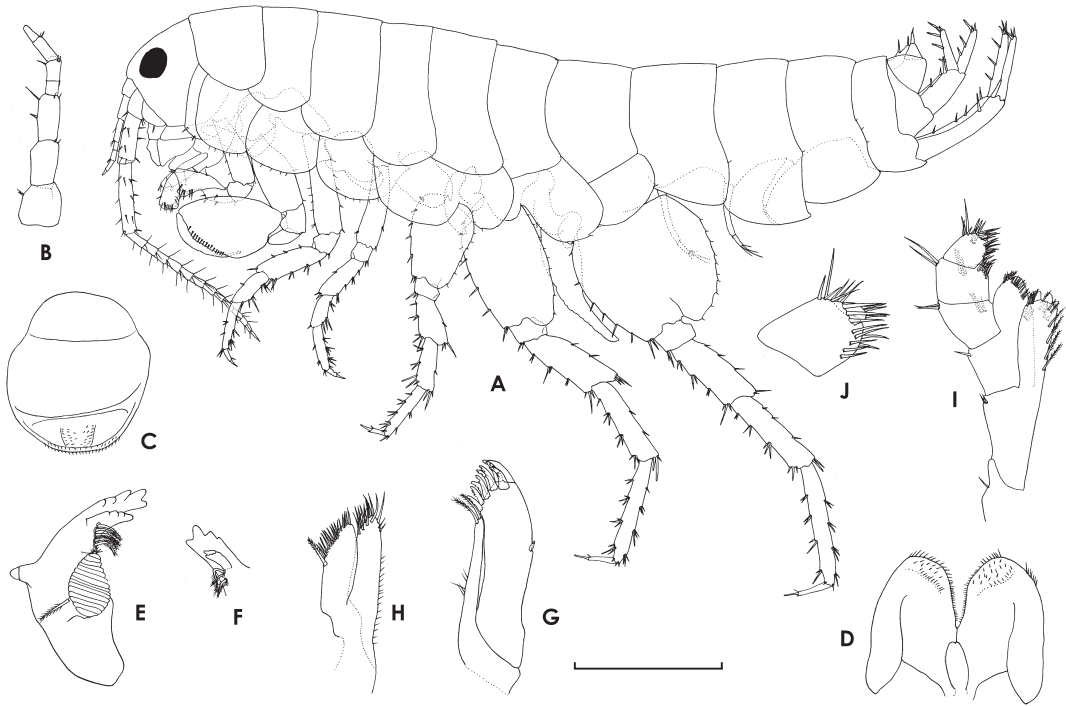


Fig. 6. *Nipponorchestia nudiramus* gen. et sp. nov. Male, 7.4 mm (holotype: NSMT-Cr 23754). Ashu, Kyoto, Japan. — A, habitus, lateral view (after Morino, 1999); B, antenna 1; C, upper lip; D, lower lip; E, left mandible; F, distal part of right mandible; G, maxilla 1; H, maxilla 2; I, maxilliped; J, palp articles 3–4 of maxilliped. Scale: A, 1.43 mm; B, 0.71 mm; C–I, 0.36 mm; J, 0.18 mm.

gills in pereopods 2 and 6 are attenuated distally (Fig. 4C–D). The Chichijima populations could be ranked in subspecies, which conclusion requires population analysis based on adequate material from over the distributional range.

The new species is characterized by the flagellum of antenna 1 with curved article 1 and elongate article 2. The same feature is figured in "*Parorchestia*" *lagunae* Baker, 1915 (Baker, 1915, pl. III), from shores of a lake in Luzon, Philippines. In addition, developed pellucid lobes on merus, carpus and propodus in male gnathopod 1, apically attenuate dactylus of male gnathopod 2, marginally bare outer ramus of the uropod 1, weakly robust-setose uropod 3 are shared with *N. curvatus* sp. nov. The former, though poorly described, is still distinguished from the latter by the developed pleopods (the rami subequal to the peduncle in length).

The coastal habitats and geographical distribu-

tion, especially rich occurrence over southern oceanic islands, of the present new species suggests the relatively high dispersion ability on ocean, possibly with the aid of rafting material of terrestrial origin, as contemplated by Wildish (2012) for east Atlantic talitrids.

### *Nipponorchestia nudiramus* sp. nov.

[Japanese name: Togenashi-okatobimushi]

(Figs. 6–7)

"*Parorchestia*" sp. 2: Miyamoto, 1982: 94

"*Parorchestia*" sp. 3: Morino, 1999, 640 (Fig. 1), 644.

*Type material.* Holotype (NSMT-Cr 23754) male 7.4 mm, allotype (NSMT-Cr 23755) female 7.7 mm; Ashu, Research Forest (Kyoto University) (*Aesculus turbinata*), KYOTO; 5 Aug. 1991; Watanabe, H. collect. Paratypes: 7 males, 5 females, 39 juveniles (NSMT-Cr 23756), same data as holotype; 1 female (NSMT-Cr 23762) 9.2

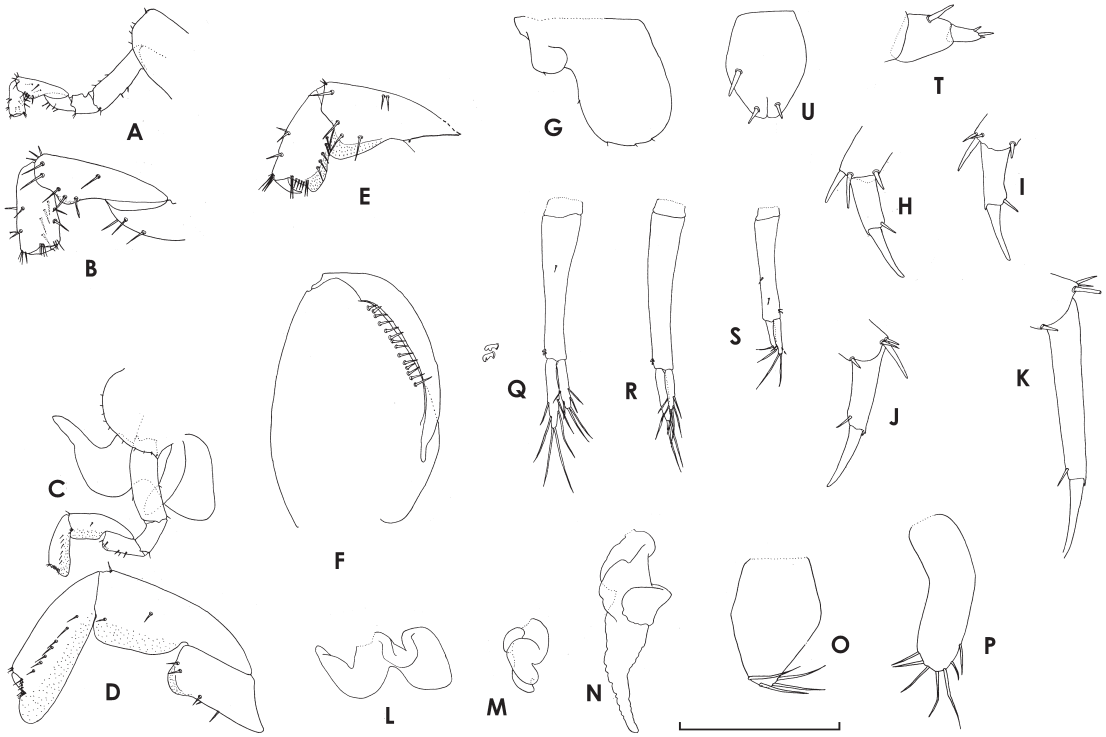


Fig. 7. *Nipponorchestia nudiramus* gen. et sp. nov. A–D, female, 7.7 mm (allotype; NSMT-Cr 23755); E–U, male, 7.4 mm (holotype; NSMT-Cr 23754). Ashu, Kyoto, Japan. — A, gnathopod 1; B, distal articles of gnathopod 1; C, gnathopod 2; D, distal articles of gnathopod 2; E, distal articles of gnathopod 1; F, distal part of gnathopod 2; G, coxal plate of pereopod 6; H–K, dactyli of pereopods 3–5, 7; L–N, coxal gills of pereopods 2, 3, 6; O–P, oostegites of pereopods 5, 2; Q–S, pleopods 1–3 with enlarged retinacula; T, uropod 3; U, telson. Scale: A, C, L–N, 1.43 mm; B, D–F, Q–S, 0.56 mm; G, 1.09 mm; H–K, T, U, 0.28 mm; O–P, 0.71 mm.

mm; Osaka Tunnel (*Cryptomeria* forests, 420 m alt.), Chikatsuyu, Nakahechi-cho, WAKAYAMA; 7 Oct. 1976; Morino, H. collect.

**Additional materials examined.** KANAGAWA: 2 males, 4 females, 1 juvenile (NSMT-Cr 23775); Daijōji Temple (*Cryptomeria*), Minami-ashigara; 1 Oct. 1998; Miyamoto, H. collect. 1 female, 1 juvenile (NSMT-Cr 23776); Kiga Hot Springs, Hakone; 15 Oct. 1978; Miyamoto, H. collect. 1 juvenile (NSMT-Cr 23781); Daigatake (in forests), Ashigarashimo-gun; 6–7 Oct. 1983; Aoki, J. collect.

FUKUI: 10 females, 2 juveniles (NSMT-Cr 23778); Akiu, Ono-gun; 22 Jul. 1980; Miyamoto, H. collect.

AICHI: 3 females, 7 juveniles (NSMT-Cr 23774); Horaijiyama (*Cryptomeria*); Minamishi-

dara-gun; 5 Nov. 1978; Miyamoto, H. collect.

MIE: 7 females (ovig.), 1 juvenile (NSMT-Cr 23777); Mt. Asama (400 m alt.), Ise; 8 Aug. 1978; Miyamoto, H. collect.

KYOTO: 2 males, 2 juveniles (NSMT-Cr 23753); Kibune Shrine (*Acer* forests); 28 Mar. 1971, Morino, H. collect. 3 males, 2 juveniles (NSMT-Cr 23757); near Ochiaibashi (*Cryptomeria* forests), Ashu, Research Forest (Kyoto University); 16 Sept 1971; Morino, H. collect. 2 males, 6 females, 5 juveniles (NSMT-Cr 23760); Ashu (*Fagus crenata*, *Quercus crispula*); Sept. 1975; Tsukamoto, J. collect. 1 female (NSMT-Cr 23765), Mt. Atago (*Cryptomeria* forests, 600 m alt.); 2 females, 1 juvenile (NSMT-Cr 23761), Mt. Atago (*Cryptomeria*, *Acer* forests, 880 m alt.); 26 Sept. 1976; Morino, H. collect.

NARA: 1 juvenile (NSMT-Cr 23768); Mt. Kongo (550–800m alt.), Gose; 3 Nov. 1975; Nunomura, N. collect. 1 juvenile (NSMT-Cr 23770); Nakanosenbon (480m alt.), Yoshinocho; 5 May 1975; Nunomura, N. collect. 1 female, 8 juveniles (NSMT-Cr 23773); Hasedera Temple (primary, evergreen, broad-leaved forests, 250m alt.), Sakurai; 26 Jul. 1981; collector not known. 5 females (NSMT-Cr 23782); tributary of Kanno River (collected with an underwater net), Totsugawa-mura; Aug. 2005; Kobayashi, S. collect.

OSAKA: 1 female (NSMT-Cr 23769); Shoen (*Cryptomeria* forests), Minoo; 12–15 May 1977; Nishikawa, Y. collect.

WAKAYAMA: 7 males, 3 juveniles (NSMT-Cr 23758); Yunomine (valley), Hongu; 24–25 Jun. 1972; Morino, H. collect. 2 females, 7 juveniles (NSMT-Cr 23780); Osugidani, Shizukawa, Hongu; 8 Aug. 1980; Yoshida, M. collect. 1 female, 1 juvenile (NSMT-Cr 23764); Buju River (wetland), Hongu; 7 Oct. 1976; Morino, H. collect. 5 females (ovig.) (NSMT-Cr 23759); Shimoayukawa - Fukatani; 9 Jul. 1972; Morino, H. collect. 3 females, 5 juveniles (NSMT-Cr 23763); Osaka Tunnel (*Cryptomeria* forest, 420m alt.), Chikatsuyu, Nakahechi-cho; 7 Oct. 1976; Morino, H. collect. 7 females, 5 juveniles (NSMT-Cr 23766); Kurokuratani (500m alt.), Mt. Notakeboshi; 25 Mar. 1977; Komeda, S. collect. 3 females (NSMT-Cr 23767); Mt. Notakeboshi; 27 Mar. 1977; Komeda, S. collect. 3 females, 10 juveniles (NSMT-Cr 23771); Mt. Eboshi, Shingu; 26 Jul. 1981; collector not known. 19 juveniles (NSMT-Cr 23772); Nachikatuura (primary, evergreen, broad-leaved forests, 250m alt.); 26 Jul. 1981; collector not known. 4 females, 8 juveniles (NSMT-Cr 23779); Kotonotani (under litter); Susami; 14 May 1981; Yoshida, M. collect.

*Description of male (holotype).* Antenna 1 (Fig. 6B), flagellum with 4 articles, article 3 longest. Antenna 2 (Fig. 6A), flagellum with 13 articles.

Gnathopod 1 (Figs. 6A, 7E), merus lacking pellucid lobe, carpus *ca.* 1.4 times as long as pro-

podus, propodus with 4–5 setae on lateral surface, palmar margin vertical, exceeding dactylus. Gnathopod 2 (Figs. 6A, 7F), palmar margin subequal to posterior margin in length. Dactylus of pereopods 6 and 7 (Fig. 7K) slender, straight. Coxal gills of pereopod 2 (Fig. 7L) and 6 (Fig. 7N) large, distally attenuate, lobe developed.

Pleopods 1–3 (Fig. 7Q–S), rami *ca.* 0.3 times as long as peduncles, with faintly articulated 2–3 articles. Uropod 1 (Fig. 6A), inner ramus with 3 robust setae on dorsal margin. Uropod 3 (Fig. 7T), peduncle with 1 dorsal robust seta, ramus with 3 apical robust setae. Telson lobe (Fig. 7U), with a lateral and an apical robust seta.

*Female (allotype, sexual characters).* Gnathopod 1 (Fig. 7B), carpus with small pellucid lobe, propodus with 2 submarginal robust setae on lateral surface. Gnathopod 2 (Fig. 7C–D), basis slender, pellucid lobe on merus small. Oostegites of pereopod 2 (Fig. 7P) and 5 (Fig. 7O) with 7 and 4 simple-tipped setae, respectively, on distal margin.

*Etymology.* The species name refers to the marginally bare outer ramus on the uropod 1, which contrasts with the marginally robust-setose uropod 1 of ecologically equivalent species, *Mizuhorchestia urospina* Morino, 2014. Both species occur in similar types of habitats and exhibit allopatric distribution.

*Distribution.* The present species shows restricted distributional range, being collected from under litter of inland and mountain forests in central parts of Honshu (Fig. 8). The vegetation of the habitats ranges from coniferous (mainly of *Cryptomeria* trees) to broad-leaved deciduous forests.

*Remarks.* The allotype (female, 7.7mm) and a paratype (female, 9.2mm) have antenna 2 with 12 flagellar articles, and telson with 1 lateral and 1–2 apical robust setae. Larger male (8.2mm, NSMT-Cr 23775) bears pellucid lobe on merus, in addition to carpus and propodus. Lack of the lobe on merus in the holotype male is due to smaller size. The present new species is distinguished from *Nipponorchestia curvatus* sp. nov. by the features described above. The most practi-



Fig. 8. Distribution of *Nipponorchestia nudiramus* gen. et sp. nov. ★ from Miyamoto (1982).

cable feature among them is the antenna 1 flagellum, which in *N. curvatus*, is curved in article 1 and elongate in article 2.

As far as females are concerned, "*Parorchestia*" *kinabaluensis* Shoemaker, 1935, from Borneo, displays similarity to *N. nudiramus* sp. nov. in the shape of antenna 1, and general facies including antennae 2, gnathopod 1 and maxilli-

ped. However, anteriorly expanded basis of gnathopod 2, strongly reduced pleopod 3, strongly robust-setose uropod 2 (outer ramus) and uropod 3 (ramus and peduncle), and lack of lateral robust-seta on telson are unique to "*P.*" *kinabaluensis*.

As mentioned elsewhere, this species occupies the same types of habitat as *Mizuhorchestia uro-*

*spina*, *e.i.*, inland and mountain forests, and exhibits complimentary distribution to the latter (see Morino 2014a, fig. 4), the boundary running in middle Honshu, across Wakasa (Japan Sea side) and Osaka Bays (Pacific side). Miyamoto (1982) illustrated the distribution of these two species in Hokuriku district in detail and discussed the boundary. This pattern of allopatric distribution suggests that the interaction with the congener could be one of the factors limiting western boundary of distribution in *N. nudiramus*. At the same time, *N. nudiramus* sp. nov. and *N. curvatus* sp. nov. inhabit different habitat types: inland to mountainous forests and coastal habitats, respectively. The northern boundaries of distribution in both species roughly correspond to each other, suggesting the distribution of the putative common ancestor.

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